BUSINESS DEVELOPMENT ANALYSIS ON SUB-SAHARAN AFRICA

Case: BioSorbio

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Abstract

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Abstract

Agritech, a $3 trillion industry has been one of the fastest-growing business segments for over a decade. Technological breakthroughs in automation, cultivation, and food processing technologies have pushed the development onwards and created new attraction to an industry which has a direct impact on the life of people across the globe. Africa plays a key role in the fertilizer and agritech industry, as over 60% of its population are smallholder farmers and it contributes a total of 23% of Africa's GDP.

The objective of this thesis was to analyze the current trends and socio-economic conditions which are affecting the agritech and food industry in Sub-Saharan Africa. This thesis focuses specifically on fertilizers and biotech as the case-company, BioSorbio, is operating in the industry. BioSorbio manufactures environmentally friendly solutions to answer the growing need for organic fertilizers and oil- and water remediation.

The body of the research can be divided into two categories: empirical research and market research trough secondary methods. Empirical research has been conducted through interviews while the market analysis uses Porter's Five Forces model in the socioeconomic evaluation of Sub-Saharan Africa.

The results of this research are used to develop the business of BioSorbio and help to expand the operations of its recently established subsidiary, BioRaiser Zambia. The thesis also aims to provide insights into the global agritech industry to introduce the reader to the ever-growing business of agri- and biotech.

Keywords

Agritech, biotech, business development, market research

CONTENTS

ABBREVIATIONS AND TERMINOLOGY

AGS – Accelerated Growth for SME's

SME – Small to medium enterprise

Seedbed – A natural or synthetic soil to grow crops from

B2B – Business to business sales

B2C – Business to customer sales

B2G – Business to government sales

Agrotechnology – Applied technologies in agriculture and livestock

Agritech – Synonym, see agrotechnology

Foodtech – Technology used in food processing or farming

Biotech – Abbreviation for biotechnology

NGO – Non-government organization

EU – European Union

COVID-19 – Abbreviation for Coronavirus disease 2019

GDP – Gross Domestic Product

R&D – Research and development

BC+ - Bio Circular Plus

ROI – Return on investment

CTA - Technical Centre for Agricultural and Rural Co-operation

IP – Intellectual Property

SADC – Southern African Development Community

CAGR – Compound annual growth rate

FDI – Foreign Direct Investment

CPI – Customer Price Index

SAP – Super Absorbent Polymer

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1 INTRODUCTION

1.1 Thesis Background

This part introduces the reader to the topic and reasons why this subject is relevant to research for the company and to investigate new business opportunities in Sub-Saharan Africa. This chapter also presents the used research methods and the overall framework the study is formed around.

African agrotechnology (agritech) market is diverse and can be challenging for foreign companies to access. This is due to the varying economic conditions and general cultural differences in business policies and smallholder farming. Finland is an exceptionally good starting point for a startup that is looking for expanding or launching a product in the African market – it provides extensive support and training through government-led programs and business ventures. Examples of this are the SME Aisle business delegations and the Finnish Business Week in Zambia, which are hosted by The Finnish Government in collaboration with AGS (Accelerated Growth for SME's) program, Business Finland, Finnpartnership, and SME Aisle Project (organized by Satakunta University of Applied Sciences). These kinds of projects are vital for smaller companies to boost to the African market, as the organizing partners help the participating companies with practical matters as well as with networking and finding possible business partners during the delegation.

Bio Circular Plus

BioSorbio has planned to launch a new product called Bio Circular Plus (BC+) in 2020 to support and expand its current product portfolio. The need for a new product has been recognized after the recent changes made to the European Union's current fertilizer-law (Finnish Government 2019). The legislation affects the whole EU and has taken effect in 2019.

The current government guideline states the following:

> *The measure recommends developing fertilizer restrictions in line with plant needs, encouraging the processing of manure, especially in areas with surplus manure, increasing the use of crop recycling nutrients, increasing processing skills, and, promoting demand for organic fertilizer products, especially through agri-environmental compensation.*
>
> (Ministry of Agriculture and Forestry of Finland 2019)

After recognizing the opportunities the legislative changes opened, BioSorbio has developed a new kind of add-on fertilizer, BC+, which ultimately tries to overcome the mentioned challenges with methods of capillary filling and natural biodegradation. BC+ is a so-called add-on product, which is added to the liquid manure before the initial application to the crop. This helps to bind the manure to the soil, reducing the impact of watering or rainfall, which ultimately helps to maximize the utilization of nutrients in manure. The slowly happening biodegradation causes the capillaries to crack, which then releases the manure steadily over time for the use of the planted crops. This also helps to prevent unnecessary soil-leakage of nutrients.

The product's effect has been researched comprehensively with Helsinki University Biological Station and with small-scale field tests run with the Helsinki University Laboratory. Also, some of the distributor and product development analyses have been completed already which helps in identifying the final sales channels and production necessary for the successful launch of the product.

1.2 Thesis Objectives, Research Questions, and Limitations

The main objective of this thesis was to identify and analyze different business opportunities in the African market from a viability and business standpoint. BioSorbio's subsidiary, BioRaiser Zambia, is in a key role as it already holds a market footprint and connections in the Zambian market. This thesis assesses different opportunities, from contract-based business deals to consumer sales options and collaboration with non-governmental organizations (NGO's). The research results will be used to plan and develop the sales operations for the novelty product, BC+ as well as the general ongoing business in Sub-Saharan Africa.

1.2.1 Research Questions

As agriculture holds a significant value in Africa's economy, the author chose to form more extensive research on the external market environment and focus mainly on the socio-economic aspects of agriculture and agritech in the Sub-Saharan market. Considering the company's current market footprint and resources available, the objectives were condensed into three research questions.

The main research question is:

> *How is the local economy affecting agritech-business in Sub-Saharan Africa and what are the best countries for BioSorbio to expand to economy-wise?*

To support the main research question, the author chose two other aspects of the business that should be noted when analyzing and planning a future business in Sub-Saharan Africa.

The first analyses the competitiveness of the market:

> *How competitive is the agritech market in Sub-Saharan Africa and what are BioSorbio's biggest competitors?*

The second supportive question helps to form a wider picture of the agritech market as a whole and supports the main question:

> *What are the future trends of Agritech and Agriculture globally and in Sub-Saharan Africa?*

1.2.2 Objectives

This thesis will follow the structure demonstrated in figure 1.

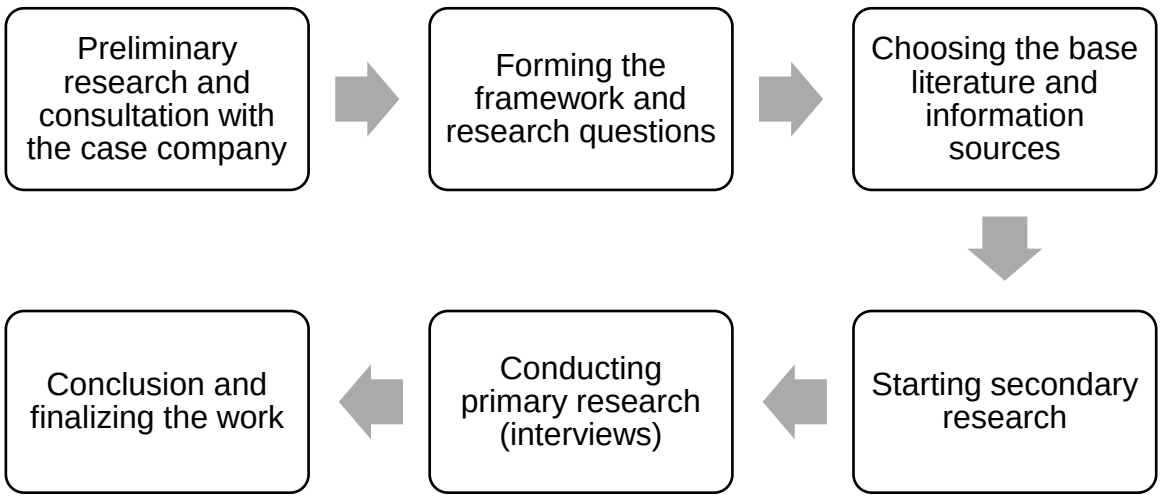

Figure 1. Thesis objectives

1.2.3 Limitations

As the COVID-19 quarantine affected all travel at the moment of conducting the research, in-person interviews are not be included as a part of this study. The quarantine also affected heavily on the availability of written literature and so, electronic sources are only used in this thesis. Limitations are also apparent in the chosen topics of the study as the context and results are meant to be serving the case company and cater to its future business development. Also, due to the competitive nature of the business, key indicators of business development and partnership information are deducted to avoid sharing vital operational information.

Because of the unbalanced credibility of market information and to streamline the research, this study will mainly focus on the Sub-Saharan countries, which excludes Algeria, Djibouti, Egypt, Libya, Morocco, Somalia, Sudan, and Tunisia from the research.

1.3 Theoretical Framework

Even though the focus of this research is to assess the opportunities in the African Agritech market, some global background research is done to introduce the topic to the reader and to compare the prevailing African market environment with concurring global trends. The author has chosen commonly known and trusted methods and tools for analyzing the market to provide accurate data that can be easily verified.

For the basis of this research, the author has chosen two books to provide the theoretical framework and background knowledge needed to build extensive research, Tesar & Kuada's *Marketing Management and Strategy – An African Casebook* (2013) and Michael Porter's *Competitive Strategy – Techniques for Analyzing Industries and Competitors* (1998). The latter is selected especially for its tools on assessing the market's external environment and to find functional methods of measuring the socioeconomic conditions in the Sub-Saharan market.

The research starts with the fundamentals to form a basis for the study. Interpreting the Finnish and global agritech market gives the research a solid foundation and a good parallel point to compare to. This is followed by a more in-depth analysis of the Sub-Saharan market through Porter's market evaluation tools and followed by a conclusive analysis of how the found data can be utilized in the company's future sales and marketing techniques. Because of the subsidiary's location and availability of data, the research will be mainly focusing on countries located in Sub-Saharan Africa and SADC-countries.

1.4 Research Methodology and Data Collection

This part explains the different indicators and methods used to assess market data and form the guidelines for market research. Due to the nature of the business, this research is conducted mainly through external and independent information sources. As of 2020, BioSorbio's products are not marketed nor sold in the consumer market. Even though this study analyses potential market opportunities in the consumer and wholesale industry, a further price analysis will be excluded from this study due to the lack of public price listing of the product portfolio.

In the context of Sub-Saharan Africa, data credibility is always an issue. This is why the author has chosen to use credible and independent data sources such as the FAO, World Bank, and consultative agencies operating independently from the governments and governmental organizations.

Trends and Segmentation

Market trends can be kept as a fundamental indicator of the current financial, demographic, and societal market situation. Analyzing historical data and the current status can provide critical information when planning on expanding business operations or launching a product in a new market area.

Market segmentation is an effective way of analyzing different possibilities with compiling target audiences with similar psychographic, behavioral, geographic, and demographical structure. In this study, the segments are divided between three sales channels: Business-to-business (B2B), Business-to-organization (B2O), and Business-to-government (B2G). Because organizational and business sales tend to share a lot of similarities, a generic B2B is used to indicate both of the sectors. Also, to achieve homogeneity within the segments, the author is using four different factors to measure equality in the clusters while forming conclusions (Gavett 2014):

- Location
- Substantiality (The estimated weight of the possible business deals)
- Market and long-term value
- Risk (Resources and estimated risk of investments)

1.4.1 Porter's Five Forces

Porter's Five Forces is a long-known method of assessing the market's micro-economic environment and the potential competition. This model is effective in measuring a single market, involving one area of business (Harvard Business School 2020). As such, Porter's model is popular amongst strategy consultants and is used to assess and develop a business when forming a qualitative evaluation of a business's strategic position. In this study, Porter's model is used to evaluate the African fertilizer market and to find ways to expand the current operations of BioRaiser Zambia. The model is further supported by other external factors such as local legislation and political constraints which could affect the business in the African market.

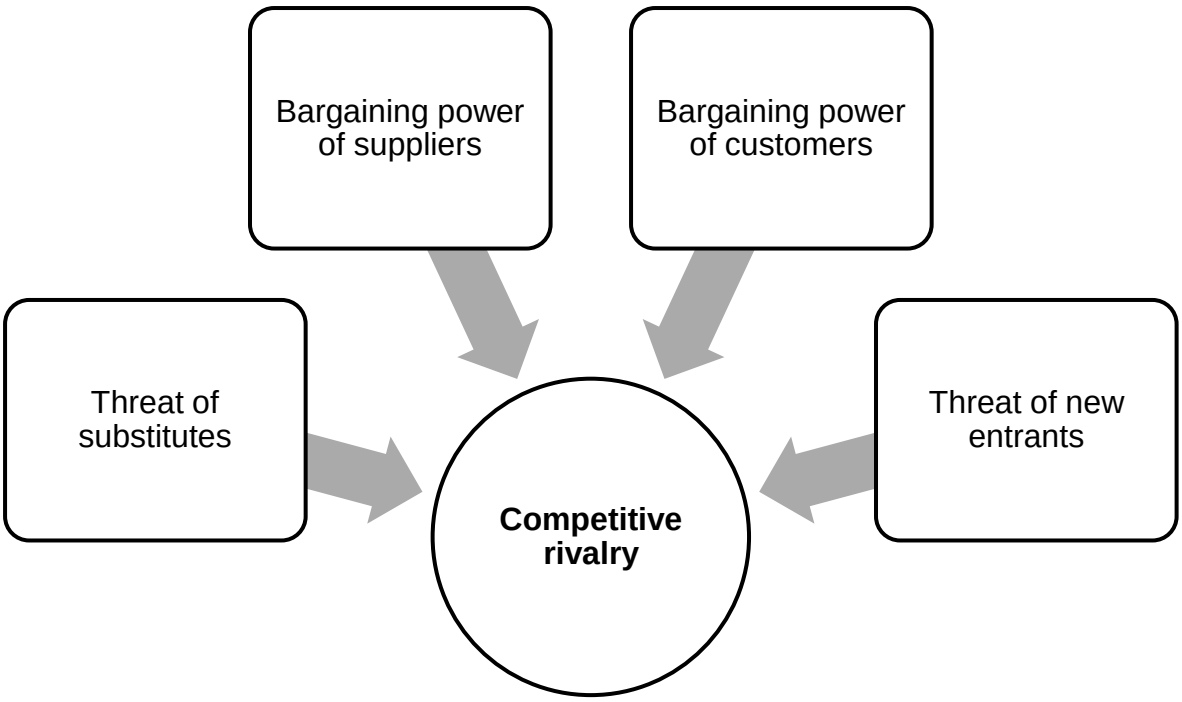

Figure 2. Porter's Five Forces Model

Competitive Rivalry

Competitive rivalry refers to the overall competition in the market and how the market is shared between the biggest players.

Threat of Substitutes

The threat of substitutes measures the competition in terms of alternative products that fulfill the same functionalities as marketed products. This could create challenges in the marketing and pricing of the goods.

Bargaining Power of Suppliers

Measures the effects of supplier leverage in the business. This includes pricing advantages, quality control, and the overall availability of their products.

Bargaining Power of Customers

Bargaining Power of Customers is used to analyze the amount of leverage the customers have in the studied market. This section correlates heavily with substituting products in the market, as more competition can often lead to a buyer's market.

The threat of New Entrants

Part of the analysis that measures the threat new competitors could pose to the company. Indicates the overall attractiveness of the industry and the possibility of potential plagiarism.

(Porter 1998).

1.5 Thesis Structure

This thesis consists of six main chapters: introduction, presenting the case company, outlook on the global agritech market, analysis on the African agricultural market, empirical research and data analysis, and a conclusive chapter followed by a final summary and authors' personal opinions. The body of the research is divided between introductive segments and the main research itself. The introductive chapters present the case company and global context to the reader while the market analyses form the core of this thesis. The conclusive segment compiles the key findings of this research and showcases different methods of implementing the findings in BioSorbio's operations.

Structure of this thesis:

- Introduction
- Presenting the Case Company
- Outlook on the Global Agritech Market
- Analysis on the African Agricultural Market
- Empirical Research and Data Analysis
- Conclusion & Summary

2 PRESENTING THE CASE COMPANY

2.1 Background

Figure 3. BioSorbio Logo

BioSorbio is a Finnish company, which specializes in the manufacturing of fertilizers and nitrogen compounds, in the form of seedbed-solutions and nutrient recycling solutions. The company was founded in 2018 in Seinäjoki, Finland, and currently employs approximately 10 people in Finland. After a merger in 2020, what was initially known as BioRaiser, rebranded to BioSorbio and expanded its product portfolio with oil- and water system remediation IP's. In 2019, the company also expanded to the African market with the establishment of BioRaiser Zambia, with Chris Ndhlovu as its CEO. As of 2020, the author of this thesis is working as a Sales Representative at the case company. During his employment, he has participated in multiple business conferences such as Agritech Expo Zambia 2019, Slush Helsinki 2019, and helped with the groundwork on establishing the subsidiary company to Zambia.

The technology behind BioSorbio's IP's dates back to the 1990s when the initial compound was invented. Since then, the product has been developed through field and laboratory testing and harnessed to different environmental uses. BioSorbio's portfolio consists of three main product lines, BioRaiser -seedbeds and mobile production unit, BioSorbio's oil absorption products, and an Algae Collector Unit.

2.2 Product Portfolio

BioRaiser Algae Collector

In agriculture, fertilizer leaching is a common issue that can be caused either by rain or irrigation. This can eventually lead to contamination of groundwater or eutrophication of water bodies located close to the crop. Algae Collector has been developed to fight this issue

with minimizing or eliminating the damage that has been caused to the environment through fertilization. By reversing this circulation, nutrients can be collected and reused, which both helps the environment and save costs in fertilization.

In 2019, the algae collector received funding from Business Finland and was selected for piloting at Lake Okeechobee in Miami. The pilot is currently done in collaboration with the US Army Corps of Engineering, Royal Consulting Service, and Florida Equipment and Restoration. The goal of the project is to validate the properties of the product and to collect and recycle nutrients from the heavily polluted lake. This will improve the health of the waterways and collect the nutrients into a usable soil amendment product (BioRaiser, 2020).

BioRaiser Seedbed and Mobile Production Unit

Figure 4. BioRaiser GROW® & Mobile Container Unit

Most of the products in the fertilizer market are either fertilizers or for water-binding agents, used together with nutrients. BioRaiser has been developed to fulfill the purposes of both of these categories and offer a sustainable way of fertilizing plants in difficult cultivation conditions. By combining these functionalities, BioRaiser offers a very sustainable method of fertilization and helps to reduce the overall usage of water up to 70% and offers fertilizer savings of 50 to 70%. BioRaiser is also completely non-toxic and biodegradable and does not dissolve to the soil after watering, which can be a problem with traditional fertilization products.

The cost of logistics is also a major factor behind the price of fertilizer (Gro Intelligence 2016). By utilizing nano-capillary technology, the mixture remains lightweight and easy to transport. Logistics is also considered in the form of production, as the seedbed can be

manufactured directly on-site with the mobile production unit. This helps to reduce the environmental impact caused by over-seas transportation and allows high levels of local production capacity. As of 2020, the mobile container unit has financing options which cover up to 70% of the total initial investment.

BioSorbio Oil Amendment Products

Along with the rest of the portfolio, the key aspects of the BioSorbio-product line are in sustainable materials that allow near-zero environmental impact. This is achieved by using recyclable and non-toxic materials that allow for an efficient oil- and liquid recovery process where the collected matter can be compressed out and reused. The two products, BioSorbio ORIGINAL and BioSorbio SPECIAL share a lot of technical aspects but differ in the applied solution – Original is meant to be used with liquids less dense than water and SPECIAL can be used with all absorbable liquids.

3 GLOBAL AGRITECH MARKET OVERVIEW

3.1 Introduction

Agritech, food tech, and agribusiness as terms are quite new, even though the technologies for farming, livestock, and biochemistry have been researched and developed for a long time. Generally speaking, agritech comprises any technologies that can be harnessed into farming, food, livestock, or forestry, either directly or indirectly. The recent development in satellite technologies, weather forecasting, and mobile software has pushed the sector more to the public and raised interest in the technology markets.

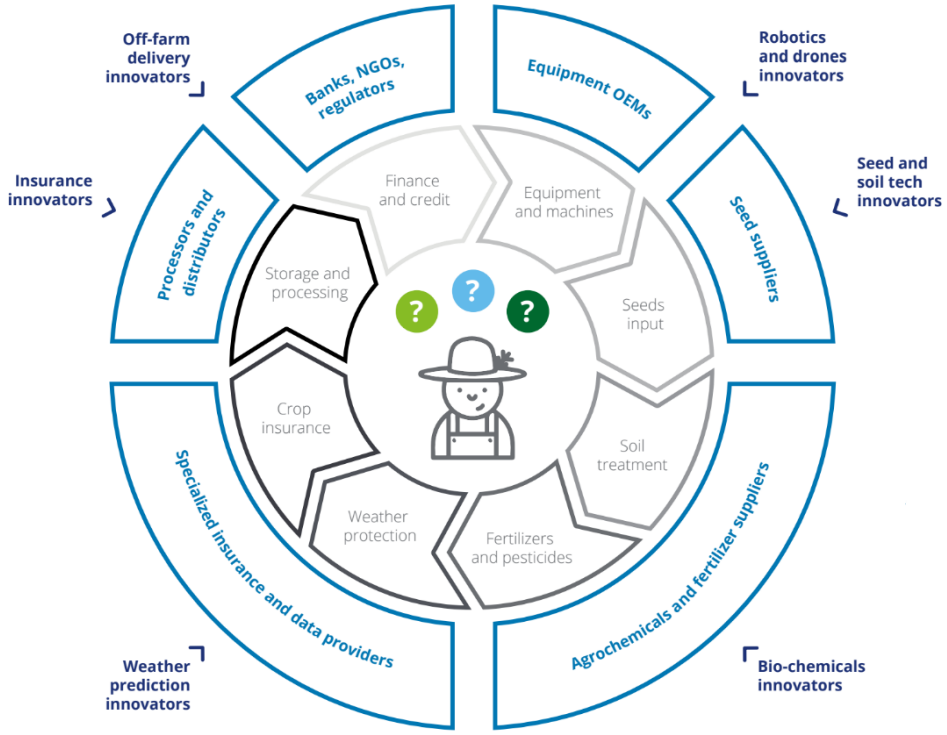

Figure 5. Farmer innovator-cycle (Deloitte 2016)

Today agritech is a $3 trillion industry (Sorvino 2017). Automation and applied software solutions have created new interest in the otherwise traditional-considered business. Startups weight a lot in this equation, as they are the main driving force behind the sector's economic growth. Only in the EU, agritech-focused startups have generated over $22 billion in total funding (Crunchbase 2020). A good example of market growth is a company called CropX, which develops wireless solutions to monitor soil moisture in real-time.

Together with easy-to-use web and mobile applications, the startup has raised over $22 million in funding during its relatively short 7-year lifespan (Crunchbase 2020). The biggest impactors of the current agritech market are the US, Israel, and China. These countries together count for approximately $3,5 billion in the global agritech market in overall venture capital raised, though the focus is slowly shifting towards more emerging markets (Deloitte 2016).

3.2 Megatrends

According to Deloitte's 2016 research, the turn of agritech into a high-tech industry has been a result of ten global disruptors:

- A growing population
- Societal and demographic changes
- Increasing urbanization
- Climate change
- Smart agricultural technologies
- Biotechnology
- Servitization around core products
- Increasing value chain integration
- Globalized trade
- Changing international regulations

(Deloitte 2016)

In the center of these megatrends are startups, which are forming a significant amount of the overall R&D that goes into developing digital agritech solutions.

3.3 Fertilizers in Agritech

Generally, fertilizers consist, or are mixtures of, nitrogen, potassium, and phosphorous. Pure forms of these compounds are often the most expensive while mixtures are cheaper due to their lower quality and nutritional values (Gro Intelligence 2016). Often, these compounds are used with secondary nutrients such as calcium, magnesium, and sulfur, to complement the mixture and for example to help absorption or nutrient deficiencies.

Location, soil nutrient content and weather influences heavily on the choice of the right fertilizer. Also, previous cultivations as well as the used fertilizers affect the nutrient content of the soil and often influence the decision on the right fertilizer. Often, organic

fertilizers are kept as a safer option for the plants but still may induce some level of surface and groundwater pollution if applied improperly (Koenig & Johnson 2011, 3-4).

3.4 Agrotechnology in Finland

Finland, a country covered with forest by 80% (Business Finland 2020) is one of the forerunners in the agritech development industry. Short harvesting seasons and difficult weather conditions create the need for ongoing research and development. One of the reasons why Finnish agrotechnology is successful is the active consultation with the farmers and ongoing research through universities. Together, these factors create efficient and working products, which are built strictly by the end-user in mind. Also, the widespread application of ISO-certifications, such as the 14001:2004 and 9001:2008, provide a high standard of quality control through sustainable methods (Business Finland 2020).

As organic products are becoming more popular, the need for organic and animal-based fertilizers is growing constantly. This is especially apparent in Finland where organic farming already covers 12,8% of the total surface area used in food-related cultivation (MTK 2018).

3.5 Farming and Agriculture in Africa

While urbanization is a globally concurring phenomenon and small farms are becoming rarer, smallholder farming is still increasing its popularity in some Sub-Saharan countries. In Africa, the extremities are more apparent as the farmers are more divided between the more educated farmers with high crop production rates and the smaller producers, who own a relatively large amount of land but lack in financial access (Goedde, Ooko-Ombaka & Pais 2019). While many experts are forecasting exponential growth to the agricultural industry, limitations in financing options and production inputs are holding the sector in a standstill (Deloitte 2020). Better arable lands are creating more opportunities for local farmers, but without proper financing, they are not able to acquire the proper nutrients and fertilizers needed to sustain a profitable output.

4 ANALYSIS ON THE AFRICAN AGRICULTURAL MARKET

4.1 A Brief Introduction to the Market

> *Agriculture in Africa has a massive social and economic footprint. More than 60 percent of the population of sub-Saharan Africa is smallholder farmers, and about 23 percent of sub-Saharan Africa's GDP comes from agriculture.*
>
> (Goedde, Ooko-Ombaka & Pais 2019)

According to a report by the Technical Centre for Agricultural and Rural Co-operation (CTA), the agritech market in Africa is currently led by relatively young companies, where nearly 60% were launched after 2017. A majority of these companies are operating in the fields of consultation, market-connections, financial services, logistics, and macro-agricultural intelligence. Even though the coverage of agritech-focused business is almost 88% of Sub-Saharan African countries, over half of them are operating from Eastern African countries. This is explained by the customer positioning, as two-thirds of all registered farmers are located in East Africa. Out of these countries, Kenya is currently the leader in purchasing power, with the most concentration of registered, dedicated farmers (Tsan, Totapally, Hailu & Addom 2019, 18).

4.2 Data and Credibility

Directly sourced market data in Africa is quite scarce, as only a small portion of farmers are registering or reporting through official sources. This is explained by the lack of widespread internet access, general smallholder farming, and overall deficiency of academic studies. Even though many of the farmers have registered to different agritech services, only 42% use the services they have enlisted to (Tsan et at., 2019, 19). Many farmers have business links through NGO's and communal organizations that are providing the farmers' education and access to agriculture-related events without collecting in-depth information about local farming.

In terms of economic indicators and market insights, the author has chosen to focus on independently done research and data provided by non-affiliated parties of the African government, as the quality of the information varies and may be influenced by governmental or public interests (Heikkilä 2020).

4.3 Analysis of Major Customer Segments

Customer Segment Analysis on B2B and B2G Customers		
	B2B	**B2G**
Opportunities	▪ Potentially substantial profits ▪ Agile decisionmaking ▪ Allows quick shifts in partnership strategies and sales tactics ▪ Potential acquisitions create new business opportunities	▪ Longevity of contracts ▪ Large order quantities ▪ Reliability as customers ▪ Consistent and coordinated leadership
Threats	▪ CRM and consulting can be resource-heavy ▪ A partnership is influenced heavily by the financial standing of the business ▪ Potential irregularity of orders	▪ Large orders may limit the ability to maintain and supply other customers ▪ The complexity of governmental contracts ▪ Political reforms and legislation changes may cause uncertainties

Table 1. Customer Segment Analysis on B2B and B2G Customers

As table 2 outlines, the differences between B2B and B2G sales can be significant. However, due to many external factors affecting general contracting with government bodies, the case is not always so simple. For example, governmental contracts may prove themselves very lucrative in the instance of new market entry, especially when the company is just gaining access to the national market and does not yet have established significant business networks (Terry 2016). In other words, contracting with the government can be a great way of establishing a foot place in the market while gaining insights and contacts to the generally more competitive private sector.

As already outlined in section 1.4.1, the substantiality and long-term value of the deal holds a significant role in all sales. In the context of B2B sales, the key is to generate leads that lead to long-term collaborations rather than one-time sales. This translates to generating partnerships with organizations that are focused on supporting and providing services to the African agritech market and the local smallholder farmers. A good example of this is a non-profit organization Musika, which aims to stimulate and support private investments in the Zambian agricultural market (Musika 2020).

4.4 Assessing the Market through Porter's Five Forces

In this part, the author assesses the African agritech and fertilizer market from a microeconomic view, using Porter's Five Forces model. The model consists of five segments, each indicating a different external factor that affects the business.

4.4.1 Industry Rivalry

In Sub-Saharan Africa, the overall fertilizer usage levels are one of the lowest in the world (Gro Intelligence 2016). Although there is not any direct competition in the market, the fertilizer-industry is saturated with different solutions differing from plain natural additives to synthetic compounds, where the price is often the determining factor for the farmer. In Sub-Saharan Africa, over 70% of fertilizer-customers are smallholder farmers which reflects both, the pricing, and availability of fertilizer products. The general low usage of fertilizers leads to smaller yields and profits, and so, will limit the purchasing power of the smallholder farmers. In Sub-Saharan Africa, urea is the most commonly used fertilizer as it is one of the cheapest sources of nitrogen (Gro Intelligence 2016).

Figure 6. Biggest players in the African fertilizer market (Mordor Intelligence 2020)

The main competition can be divided into two categories: the mainstream fertilizer industry and the organic fertilizer industry. The author has chosen 10 companies, based on their market share and insights provided by an independent consulting agency, Mordor

Intelligence. Both of these categories are highly fragmented, meaning that no single business has a significant market share in the area (Mordor Intelligence 2020).

Mainstream fertilizer industry

- Yara International ASA
- Haifa Group
- Omnia Holdings Ltd
- Groupe OCP
- Israel Chemicals Ltd

Organic fertilizer industry

- Rizobacter Argentina S.A.
- Novozymes A/S
- Symborg
- International Panaacea Ltd
- MBFI (Microbial Biological Fertilizers International)

4.4.2 The Threat of New Entrants

With a highly fragmented market and agriculture as the leading generator of GDP in Sub-Saharan Africa, the threat of new entrants is high. As no single entity possesses a majority of the market, new companies can gain attraction fairly easily. Especially in the B2C sector, creating or working with information channels that reach the local farmers is fundamental to gain long-term customers in the fertilizer market. This means that having local market knowledge and business partners in distribution is absolutely essential to have a successful business in the market. Also, the constantly rising amount of international agritech startups forms a threat on its own.

Ease of Business Index

In an annual report provided by the World Bank, 192 countries are being ranked by their ease of doing business. The index measures the quantitative indicators of local regulations and their effect in general business. Ease of business is especially important when measuring the threat of new entrants, as regulations and the complexity of business administration have a direct effect on domestic entrepreneurship and foreign business penetration. In the Sub-Saharan region, the top-five countries to do business according to the

index are Mauritius, Rwanda, Kenya, South Africa, and Zambia (The World Bank 2020, 4). Table 1 shows the scoring of 10 best ranking countries by category. Construction permit and electricity categories have been reduced to concentrate the valuation more on economic and administrative factors.

Ease of Business Index

Economy	Starting Business	Registering Property	Getting Credit	Protecting Min. Investors	Paying Taxes	Trading Across Borders	Enforcing Contracts	Resolving Insolvency
Mauritius	20	23	67	18	5	72	20	28
Rwanda	35	3	4	114	38	88	32	62
Kenya	129	134	4	1	94	117	89	50
South Africa	139	108	80	13	54	145	102	68
Zambia	117	149	4	72	17	155	130	79
Botswana	159	82	80	72	59	55	137	84
Togo	15	56	48	120	174	131	140	88
Seychelles	147	65	144	143	36	98	128	75
Namibia	165	173	80	88	88	138	64	127
Malawi	153	90	11	79	135	127	149	134

Table 2. Ease of Business Index (The World Bank 2020)

4.4.3 Bargaining Power of Customers

The effects of the great recession of the 2000s can still be seen in the amount of FDI on the economies of Sub-Saharan Africa (The World Bank 2020). While FDI's still play a major role in most of the countries and are steadily rising, the economy hasn't yet recovered to the levels of before the big downfall.

Trading Leverage and Financing

Product financing options weight a substantial amount in the overall trading leverage. In BioSorbio's case, this comes down to four types of funding, each provided by two different bodies of the government of Finland:

- Finnpartnership: Business Partnership Support
- Business Finland Tempo funding
- Business Finland funding for research and development
- Business Finland temporary pandemic funding for COVID-19

Business-wise, the most substantial fund is the Business Partnership Support, which only includes a deductible worth of 20 to 30% out of the whole investment. This is major leverage in the African market where many of the organizations are low in resources but substantial in the case of partnerships and local market penetration.

The opportunity that a client can acquire the solution with only 1/4th of the total price of the commodity is a major competitional advantage, especially in the case where the cost of the good exceeds the market average. According to McKinsey's 2019 research, the nominal interest rates in Sub-Saharan countries are generally above 20%, which is limiting the access to working capital for smallholder farmers and impairing the market's overall purchasing power (Goedde, Ooko-Ombaka & Pais 2019).

Gross Domestic Product and Consumer Price Index

To gain a better understanding of the purchasing power of Sub-Saharan countries, the author has chosen the consumer price index (CPI) and Gross Domestic Product (GDP) to measure the prices and economic development of the studied countries. While CPI is a widely-used method to calculate the average price that consumers pay for a predetermined selection of goods (OECD 2020), GDP is a more extensive measure of the market value of all final goods and services of a nation (OECD 2020).

To streamline the CPI, the author has selected the countries with the following criteria:

- Inflation (annual %) less than 5%, higher than 0%
- The country is located in the Sub-Saharan region
- The date of the measured value is not older than 2018
- Data is available in the World Bank directory

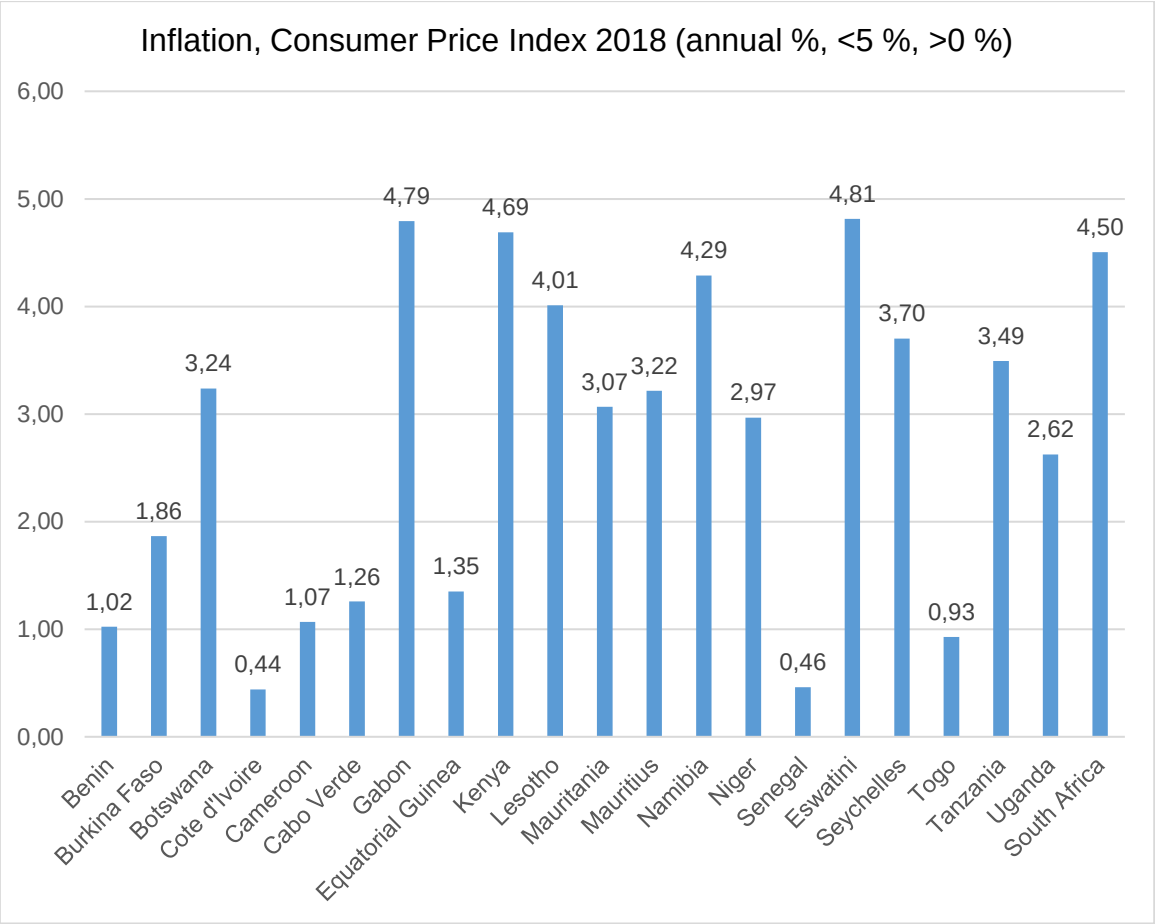

Figure 7. Consumer Price Index 2018 (The World Bank 2020)

The second measured index, GDP, gives a good overall look at the countries' economic activity and levels of domestic production. In figure 8, the differences of domestic outputs are indicated through two different methods of indicating GDP, nominal, and per capita. This highlights the inequality of income levels and gives a better vision of the share of income between smallholder farmers and enterprises.

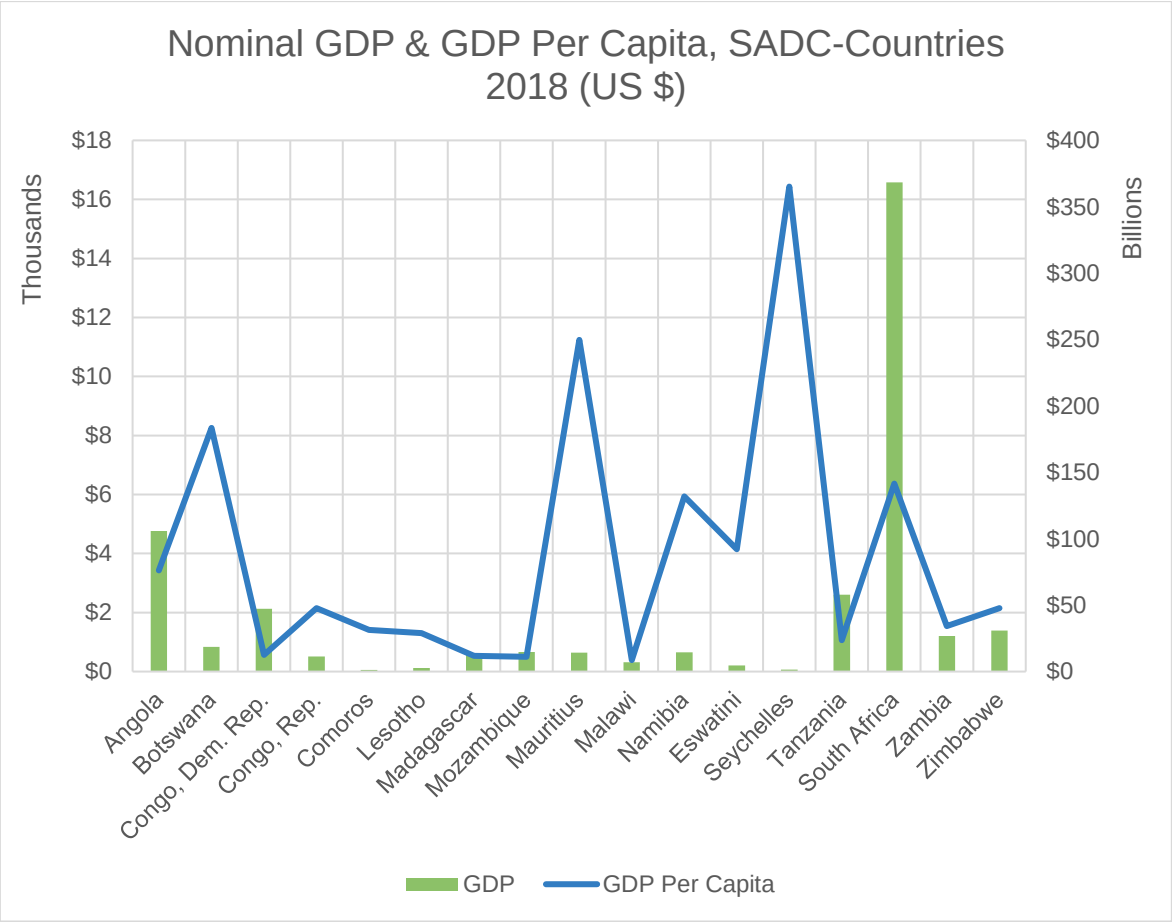

Figure 8. GDP & GDP Per Capita, SADC-Countries 2018 (The World Bank 2020)

4.4.4 Potential Substitutes

As with any product, proper protection of the company IP's is one of the fundamental aspects of surviving new market entrants, especially in the highly competitive fertilizer industry. This can be done through patents and liability agreements with business partners.

Reverse engineering has long been a problem in industrialized countries. A good example of this is China, where plagiarism has been widely accepted throughout the years and is considered a functional business strategy (Karam & Wilcox 2016, 69). While this problem is not so apparent in the African market, the strong presence of Chinese investors and companies creates a potential threat in terms of product plagiarism. As BioSorbio's products do not currently have a public consumer pricing, a further price analysis will be excluded from this study.

Superabsorbents and Moisture Retainers

Seedbeds, moisture retainers, and fertilizers are generally divided into different categories with focused uses that target a certain plant or soil with known cultivation conditions and nutrient content. Different plants absorb and require different nutrients which often means that the farmer has to purchase multiple different products to properly fertilize and condition the crop. These factors create direct substitute comparison difficult, as there is no single product that fulfills the same specifications than the BioSorbio's BioRaiser products offer.

However, the recent development in organic bio-stimulants, soil-conditioners, and superabsorbent polymers (SAP's) have pushed more products to the organic fertilizer market, which could potentially substitute and compete with BioRaiser's offering. A Chinese study made in 2010 found that mixing SAP's with fertilizers can boost seedling growth up to 47%, allowing the plant to better absorb and retain water and fertilizers, though doesn't show significant results when used on its own (Yue, Wang, B., Wang, H. & Yang 2011, 56-62). SAP's are yet to be found from the use of average African farmers, but with their technologies advancing and prices dropping, it can prove a potential threat as a substitute product in the future.

Potential Substitute: Water&Soil® Water Retainer

Water&Soil® is a company based in Hungary that specializes in water retention solutions, also known as soil-conditioners. Their name-product, Water&Soil® Water Retainer is marketed as an organic soil-conditioning product, which works for 3 months, helping the treated plants to survive drought and changing soil conditions. It is advertised to save water consumption by up to 50% and balance the overall moisture levels of the soil (Water&Soil 2020). The product was also granted a "Seal of Excellence" by the European Commission through an investment project listed in 2017 in the EIPP database (European Commission 2018).

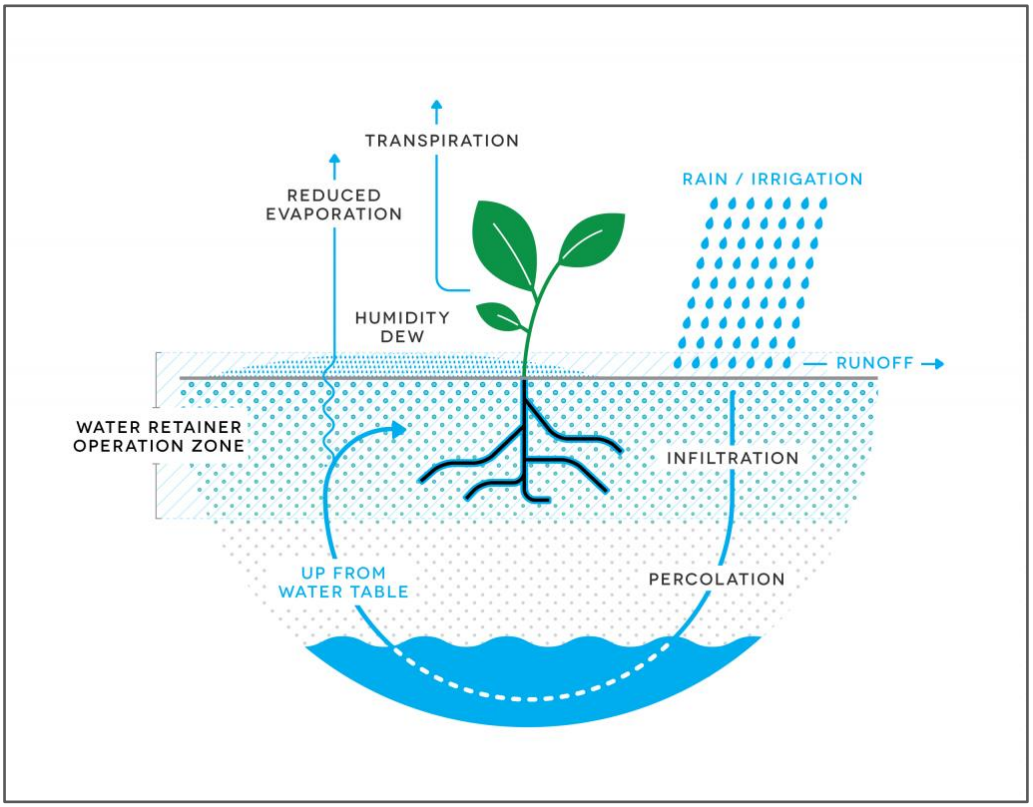

Figure 9. How the Water&Soil® Water Retainer works (Water&Soil® 2020)

4.4.5 Bargaining Power of Buyers

In the context of Sub-Saharan Africa, the majority of potential buyers are from different organizations and international companies operating in agriculture. A highly competitive market may lead to a buyer's market, where competing products fight for the same customers and could drag down the average price of all goods in the market. Generally speaking, focusing on B2B and B2G sales offers less flexibility in dynamical pricing, but also can be seen positively in terms of price sensitivity. In wholesale and consumer sales, prices fluctuate more, and contracts are redeemed generally more often than in longer organizational business contracts where reliability, flexibility, and local market knowledge often affect more on closing the deal.

FAO reports that organic cultivation covers 1,9 million hectares in 2017, out of which 1,2 million are reportedly certified for organic farming. In the Sub-Saharan region, Uganda is currently the leading country in organic production with approximately 231 000 hectares of organic cultivation area and the most demand for organic fertilization products (Mordor Intelligence 2020). As the demand is growing, the market becomes more supplier-driven and creates a positive advantage for the businesses already operating in the organic

fertilizer industry. This also opens new opportunities for new businesses and may generate more competition on the market.

4.5 Constraints and Political Factors in the Fertilizer Market

Government involvement and overall business regulations significantly affect fertilizer trading and the cost and availability of products in the market. Even though most Sub-Saharan countries have made substantial progress in deregulating fertilizer business, uncertainties still exist and affect the distribution and the everyday trading of agritech commodities (Gregory & Bumb, 2006, 19). Some of the major constraints are limitations in trader networks and overall human capital available. As the number of fertilizer and agritech traders is limited in more rural areas, the farmers are forced to buy inadequate goods with a premium.

> *The limited number of qualified input dealers in the countryside is reflected in the fact that it is easier to find "Coca Cola" than seed or fertilizer in an African village.*
>
> (Gregory & Bumb 2006, 20).

Also, there are significant lacks in overall market information and differentiation in products that create unfair advantages for the companies operating in the fertilizer industry. For example, in 2000, Malawi had over 20 different fertilizer-solutions to cover a demand of 200 000 product tons (Gregory & Bumb, 2006, 22-23). The minor differences in these products created close to a zero benefit to a smallholder farmer but increased the consumer prices of the goods. These scenarios are prone to happen in a market where information sources are limited, and farmers are not educated enough to understand product technicalities and quantities which should be applied to the crops. Lack of education is also one of the key factors behind the overall low demand for fertilizers in Sub-Saharan Africa.

5 EMPIRICAL RESEARCH AND DATA ANALYSIS

This chapter introduces the reader to the empirical part of the research. The empirical research serves a supportive function for this study and includes interviews with the Trade Advisor of the Embassy of Finland in Zambia and the Head of Research at BioSorbio. Together with secondary methods of research, their answers and opinions helped to guide the research to relevant topics and in forming the conclusions. The questions and answers can be found from the appendixes part of this thesis. The objective of these interviews was to learn how the Sub-Saharan market functions and what are the biggest challenges for new entrepreneurs when penetrating the market. The author was also interested in gaining insight into the fertilizer industry and how the products are developed to answer the demands of smallholder farmers.

5.1 Interview Design and Structure

The phone interview included in this study was made in a semi-structured format, where the questions are open-ended and provide a more personal and conversational take when compared to a strictly structured interview (Galletta, 2012, 45-46). The questions were prepared beforehand individually to both of the interviewees and were based on the interviewee's field of expertise and according to the research questions of this thesis.

As the interviewees were not available for face-to-face interviews, the interviews were conducted via phone and email. By not providing the questions beforehand, the author wanted to accentuate personal and spontaneous answers, where the expertise of the interviewees is highlighted more as opposed to questions that are provided to the interviewees before the actual interview. The interviewees were selected based on their expertise and relationship with BioSorbio and BioRaiser Zambia. While the initial plan was to interview the CEO of BioRaiser Zambia, he was unfortunately unavailable at the time of conducting the research due to conflicting schedules. The answers to both of the interviews were transcribed and translated afterward from Finnish to English by the author.

The Embassy of Finland in Lusaka was chosen as the primary interviewee as it holds a significant value for BioSorbio. The embassy helped to form the initial networks in Zambia which later led to the establishment of the subsidiary, BioRaiser Zambia. The second interview with Jaakko Mäkelä was selected due to his special expertise in biochemistry, agricultural applications, and fertilizers. He is also a key employee in the case-company.

The first interview was held on March 31st, 2020 with Marko Heikkilä, the Trade Advisor at Embassy of Finland in Lusaka. The interview was conducted through a WhatsApp call as

the interviewee was situated in Zambia at the moment of the interview. As the interview was held in a relaxed, semi-structured setting, the interview represented a more casual conversation than a formal interviewing situation. During the interview, the author took note of the interviewees' answers and thoughts and adjusted the questions accordingly.

The second interview was conducted via email on the 16th of April 2020, with the Head of Research at BioSorbio, Jaakko Mäkelä. The questions were set beforehand but allowed flexibility on the answers as can be noted from appendix 2. The purpose of this interview was to form technical knowledge of fertilizer product development and insight into the technical side of the purchase decisions of African smallholder farmers.

5.2 Data Analysis

What the author found especially important was the amount of support the embassy provides for Finnish businesses in consultation and financial services. These are truly substantial benefits for any startup, as resources are not always widely available and private consulting can turn out expensive. This is also beneficial when it comes to the initial market penetration and establishing a local subsidiary, as building the cultural and economic knowledge costs time and resources from other functions of the business.

Also, the recommendation of the Democratic Republic of Congo (DRC) as a target market was an interesting finding as the country is not generally kept in a very good light. This is mostly due to its complex and challenging history with conflicts, politics, and human rights (HRW 2009). However, during the past couple of years, DRC has seen significant development in its economy, and while it does not translate directly to the general wellbeing of the public, it can be kept as a key indicator of the direction the country is going.

6 CONCLUSION

This chapter will present the outcome of the research and answer to the presented research questions. It includes an outlook on the validity and reliability of the used data and methods of research. Also, the last subchapter presents suggestions for future research related to the topics of this thesis.

6.1 Answers to the Research Questions

What are the best markets to do business in economy-wise?

Considering the location of BioRaiser Zambia and the concurring economic conditions of Sub-Saharan Africa, the author concluded that SADC-countries hold the best market potential for BioSorbio and BioRaiser Zambia. While SADC is a rather large entity with large differences in income-levels and overall economy, South Africa is overwhelmingly the most dominant country with the most available purchasing power and economic diversity.

What should be noted though, is that with the available product financing options, the scale of the potential customers is not limited and offers great opportunities to launch on even more unfavorable economic conditions. This means that countries with relatively low government impact on businesses, such as Mauritius and Rwanda, are also favorable alternatives to the larger markets.

What are the future trends of Agritech and Agriculture in Sub-Saharan Africa?

As the research shows, even though the smaller economies are becoming more industrialized, smallholder farming shows no signs of decreasing. This is supported by non-profit organizations such as Musika, who are focused on educating and supporting the local smallholder farmers. With better education and suppliers, the usage of fertilizers becomes more regular and increases the domestic outputs of smallholder farming. International agritech companies are constantly pushing to the Sub-Saharan market and creating more competition which regulates the prices. As organic farming increases its popularity, the demand for organic fertilizers rises. To answer the demand, more and more businesses and farmers are starting to turn into organic farming and certifying their ground for organic crops.

As the gap between moisture absorbents, SAP’s, and traditional fertilizers becomes narrower, it is highly expected that smallholder farmers are turning into more comprehensive

fertilizing solutions in the future. This means that products such as BioRaiser and Water&Soil® Water Retainer are going to increase in popularity as they can be used in almost every soil and work well with different plant types.

What are BioSorbio's biggest competitors in the agritech market?

As the Sub-Saharan fertilizer market is highly fragmented, there are no singular monopolies for BioSorbio to compete against. However, as the research proved, the market is currently led by large international fertilizer manufacturers with substantial resources that can make price competition challenging and difficult to stand apart. Undeniably, BioSorbio's biggest advantage is its unique products that can be harnessed in very different situations. The company's product portfolio makes B2G sales advantageous as the partnership can be extended from simple supplying of fertilizers to a more large-scale environmental operation covering the whole portfolio of the company.

Even with the existing competition, BioSorbio should keep their heads up for new foreign businesses accessing the African market. A good example of this is the Water&Soil, which shows promising results already on the European market and has the backing of the European Commission. During the last decade, agritech has seen explosive growth and with the current forecasts, it is not going to stop shortly. To combat this, BioSorbio has already started to expand its portfolio and with the support of vital pilot projects, the future is looking bright ahead.

Being the first agritech company with an extensive portfolio in organic seedbeds and oil amendment products in the African market is huge leverage if the company decides to go in wholesale or consumer sales. The key here is to continue scaling up their Zambian subsidiary with resources that help to establish new business connections and establishing an efficient supply chain process.

6.2 Validity and Reliability

Academic research should always form around reliability and validity. Where reliability can be interpreted as a general consistency for the primary and secondary research, validity measures the truthfulness of the presented hypotheses (Golafshani, 2003).

In this thesis, the author wanted to emphasize unbiased reference material. This was achieved by using a parallel comparison on many of the secondary research sources and using only data that comes from truthful sources that are trusted by the public and academic organizations. When it comes to business-related research, bias can be hard to

notice. The author found out that many of the agriculture-related studies are either funded or conducted directly by a business that is operating in the researched market.

6.3 Suggestions for Further Research

After concluding the research, the author felt like the study could further benefit from a more in-depth comparison of the SADC-countries. Also, as the research showed, small-holder farming holds significant importance for the African economy and this factor could be researched more extensively with different socioeconomic meters. Primary research could also be conducted through different methods, such as farmer surveys and interviewing the employees of key companies in the Sub-Saharan market. Also, due to the smaller size and income levels of some of the African economies, they often get overlooked as target markets. A good example of this is the DRC, which could prove itself as an interesting study, market, and economy-wise.

7 SUMMARY

The objective of this research was to help develop the business of BioSorbio and Bio-Raiser Zambia through an external business development analysis. The study introduced the reader to the domestic- and global context of agritech and formed a socioeconomic analysis on the Sub-Saharan African agriculture and agritech market. This was achieved through Porter's Five Forces -method and assessing the potential sales channels through a viability comparison. While the research questions itself were rather straightforward, the solutions were not as unambiguous as the author initially expected. Measuring one external factor is relatively easy but given the size and competition of the analyzed market and all external factors, the research barely scratched the surface – especially on the economics and political environment of the studied countries.

During the research, the author learned a lot about how the fertilizer industry works and how complex the technical side of fertilizers truly is. Even with good electronic reference material, the author felt like the research would have benefited from more extensive primary research. Overall, the author considers the study as a success and felt like gaining truly helpful insights while forming the research.

Key findings of this research:

- Agritech is one of the fastest-growing industries globally and is estimated to be valued at $3 trillion
- Sub-Saharan fertilizer market is highly fragmented with a high number of international companies
- The usage and production of organic fertilizers is growing at a significant speed in Sub-Saharan Africa
- SAP's and Superpolymers are becoming more available in the fertilizer market
- Smallholder farming is still increasing its popularity, even though big corporations and large-scale farms are forming a significant share of the GDP
- South-Africa is the leading country in fertilizer and agritech business when measured on a socioeconomic level
- Financing and flexible payments weight a significant amount in the Sub-Saharan market as many of the smaller businesses and smallholder farmers have problems accessing capital and loans

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APPENDICES

Appendix 1

Interview with Marko Heikkilä, Trade Advisor at the Finnish Embassy of Lusaka

Appendix 2

Technical Questions with Jaakko Mäkelä, Head of Research at BioSorbio Ltd

Appendix 1

Heikkilä, M. 2020. Advisor (Trade and Economics). Embassy of Finland, Lusaka. Interview 31 March 2020. Translated from Finnish by author.

Could you state your name and position?

Marko Heikkilä, Advisor in Trade and Economics at the Finnish Embassy in Lusaka.

How long have you been working in your current role and what is your experience in the field?

My role is to promote, consult, help network, and support business between Finnish and Zambian companies. I am also responsible working together with Team Finland. Example of this is the Finnish Week of Business which also hosts the annual Agritech Expo Zambia here at Lusaka.

What is your educational background?

Master of Philosophy. I have studied geographical planning at the University of Oulu.

How did you end up working at the Embassy of Finland?

I have worked in international companies as a consultant. Before embassy, I was working several years in Namibia.

What kind of services does the Embassy offer to businesses interested starting operations in the local market?

The embassy offers consultation, market knowledge and financial mapping for Finnish businesses interested expanding or starting operations in Zambia. We also provide businesses information about government-supported funding options, such as Finnpartnership and ELY-center. After the initial support, we provide on-location support in forms of piloting, site-visits and helping to network with local businesses.

How do you find the general ease of business and administration compared to other parts of the world, for example Europe or Asia?

Self-registering is usually time consuming and challenging. We promote finding local partners to help gaining foot place in the market. Generally, a local CEO or a key-contact person helps tremendously to form the initial business contacts in the market. Business taxation is very similar to Finnish – tax deductions are also present here.

How do you find the general attitude towards foreign businesses? For example, is it easy to network with the local farmers and NGO's?

The overall attitude is surprisingly positive, for example Finnish businesses are generally valued and known for their high-quality products. The local business culture is tolerant and quite open when compared to some other African countries. Of course, money is the key-factor in most cases, and often goes before quality.

Knowing the local culture is also in a key role here. Foreign business partners are valued, especially from developed western countries.

The biggest difference between Finnish and Central-European businesses is in their sales technique. Where Finns go product-first, Europeans head with their sales and marketing skills.

How organized are the local farmers in Zambia? Is there any major labor unions or organizations that would act as a networking link for a business?

There are large amounts of different governmental organizations and unions which are often excellent in terms of information but lack in financial resources. Many of them work with zero-budgets or are funded through international projects. Personally, I recommend them as information sources but would be cautious with them as customers.

As a conclusion, what would you say as the primary advice for BioSorbio and what countries should we look more into at? How is the market divided between the Sub-Saharan countries?

Marketwise, South-Africa is the most dominant out of the Sub-Saharan countries. Its high production levels and internal entrepreneurship is hard to beat. On the other hand, Zambia has a big advantage in terms of central location and easy access to the neighboring countries.

Many times, you hear people recommending doing business in SADC-countries (Southern African Development Community), which can be a good option but also means more competition. About 70% of the people in Sub-Saharan countries have agriculture as their main source of income, so the trade opportunities are good.

My personal recommendation is to look at the markets as a whole and investigate options in the DRC (The Democratic Republic of Congo), Zimbabwe and Angola, as they have high population levels and lack in freshwater resources.

Appendix 2

Mäkelä, J. 2020. Head of Research, BioRaiser. RE: Technical Questions for Thesis. Email 16 April 2020. Translated from Finnish by author.

Could you explain briefly why and how does fertilizers dissolute to the soil?

➔ Fertilizer dissolves to water

- Metallic fertilizers are retained on the metal oxide surfaces of the soil in a non-permanent form, i.e. they remain usable by plants, assuming that there are sufficient soil oxide surfaces. Notice that this is a rough generalization.

- Phosphorus dissolves in groundwater and begins to retain on the oxide surfaces of the soil. This retention, unlike metals, is very strongly unbalanced on the oxide surface side. In practice, this means that much more phosphorus is retained on oxide surfaces than it remains in groundwater. Significant amounts of fertilizer phosphorus are lost in this phenomenon. The phenomenon also leads to soil phosphorus enrichment. Despite enrichment, phosphorus is not useful for plants, due to the imbalance mentioned above.

- The fertilizers used in Finland are practically completely water-soluble. After dissolution of the fertilizer, nitrate nitrogen is either used by plants or microbes or leached into the soil. The same is true for ammonium-shaped nitrogen, although it is retained in the soil in small amounts; however, this is of only limited relevance because ammonium is metabolized by microbes to nitrate under oxygen conditions.

What other solutions are available on the market (=competing products)?

In practice, the aim is to prevent leaching and losses by adding fertilizer at such a time of year that an unusually large proportion of it cannot be leached or evaporated. Some fertilizers (typically organic fertilizers such as meat-and-bone meal and manure) release their nutrients evenly throughout the growing season, so no major loss spikes occur.

There are hardly any products that would individually prevent such losses. Part of the culprit for this is certainly the fact that nitrogen fertilizers (which are most prone to losses) are very cheap in the western countries.

What are universally the most used fertilizers?

- Organic
    - Fertilizers such as manure and sewage sludge. Various organic by-products. Meat and bone meal etc.

- Inorganic
    - Fertilizers of synthetic origin, and, for example, products that are grinded directly from minerals. The most important non-organic fertilizers are various nitrogen fertilizers prepared through Haber-Bosch method and Phosphorus fertilizers produced from mined apatite.

What are the growing conditions typically in Sub-Saharan Africa and what are the most effective fertilizers there?

African countries are a very diverse group considering the cultivation conditions. In general, it can be said that African countries are typically highly weathered and nutrient-poor. The soils are often quite acidic.

The fertilizers are the same as elsewhere, although the losses of inorganic phosphorus fertilizers may be greater than, for example, in Finland, because the retention of phosphorus in the soil is very strong considering the mentioned weathered and acidic soils.